Pollination and Pollinarium of *Dipodium punctatum* (Sm.) R. Br.

By Peter Bernhardt† and Pamela Burns-Balogh*

Dipodium punctatum, the Hyacinth Orchid, is a common leafless saprophyte and one of the few orchid species found flowering over the summer months in Victoria (Willis 1978). Despite its wide distribution throughout the state and its large colourful flowers, virtually nothing is known of its floral biology. We present our recent observations in the hope it will encourage further field studies on this attractive plant.

A clump of six mature shoots of *D. punctatum* was found along a picnic trail off the Serra Road track in the Grampians State Forest in early January 1983. Five shoots had open flowers but one shoot remained in bud.

On 12/1/83 at 1:30 pm a native bee entered the site and was observed visiting the open flowers of *D. punctatum.* The bee visited the flowers on three stalks before it was captured. This insect was identified as a female, *Chalicodoma (Hackeriapis) derelicta* Cockerell (Megachilidae) by Ms Judith King, of the Department of Entomology at the Univ. of Queensland at Santa Lucia. The bee carried a viscidium of *D. punctatum* just above its antennae but below the middle occellus (Figure 1). However, the pollen of other species were found on the bee's body. Stylidiaceae pollen (probably *Stylidium graminifolium* Swart, as it was still in flower in the Grampians) was densely deposited between the juncture of the head and the thorax (Figures 1 and 2). The pollen of *Eucalyptus* sp. and *Bursaria spinosa* Cav. were found in the scopae of the hind legs and on the underside of the abdomen (Figure 3). Although some Australian orchids offer food hairs or a "pseudopollen" of sloughed petal cells (Jones 1981) none were found on the body of *C. derelicta.*

This is the first time that a member of the genus *Chalicodoma* has been observed visiting orchid flowers and carrying a viscidium. *Chalicodoma derelicta* has been recorded previously on the bushpea genera *Jacksonia* and *Dilwynia* (Papilionaceae) and on *Wahlenbergia* (Campanulaceae) by Ms J. King. Armstrong (1979) reviews observations of *Chalicodoma* species foraging on the flowers of Myrtaceae, Papilionaceae and Proteaceae.

The second author examined the pollen masses (pollinarium) with a Scanning Electron Microscope at the Smithsonian Institute in Washington, D.C. Each pollinarium was composed of four structures (fig. 4). There were four *pollinia* fused in two sets. The pollen grains within each pollinia were clustered in groups of four (tetrads). Each tetrad was united to other tetrads by a common wall to form hard, compact masses. There were two *caudicles,* one for each pollinia set, that served to attach the pollinia sets to the stipe. The caudicles consisted of elastoviscin produced by degenerative, sporogenous cells within the anther. The *stipe* was two branched (one branch for each caudicle) which served to attach the viscidium to the caudicle. Unlike these caudicles, the stipe was cellular. Finally, the *viscidium* ("sticky pad") adhered to the bee after the pollinarium was removed from the anther. The viscidium was shoe-like, rounded at the apex, blunt at its base and cellular like its stipe (Figure 5).

The four pollinia and their two

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caudicles were derived from the orchid flower's solitary anther. In contrast, the viscidium and its stipe were derived from the rostellum (Dressler 1981).

Although *D. punctatum* is a terrestrial orchid its pollinia had little in common with the majority of Australian ground orchids placed in the tribe, Diuridae (*sensu* Dressler 1981). For example, the pollinia of *Pterostylis*, *Diuris* and *Thelymitra* are soft and granulate. Their tetrads are threaded together by cohesion strands and not by common walls. *Caladenia*, *Eriochilus* and *Glossodia* produce granulate pollen too but these grains are separate and never united as tetrads. The hard pollinia of *D. punctatum* are composed of tetrads united by common walls and, therefore, most closely resembled members of the tropical-subtropical Tribe, Vandeae, in the subtribe, Cyrtopodiinae, such as *Eulophia* and *Cymbidium* (Dressler 1981).

This story did not have a happy ending. It was the intention of the first author to return to the Serra Road site over a seven day period to collect more insects that may have pollinated *D. punctatum*. However, the following day the author found that someone had found the plants and picked *every* flowering stalk, uprooting two!

Acknowledgements

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Fig. 1 The head of *Chalicodoma derelicta* bearing the viscidium of *Dipodium punctatum* and the pollen of a member of the Stylidiaceae. × 15. A = antenna; O = middle ocellus; SY = Stylidiaceae pollen; V = viscidium

Fig. 2. Pollen grain of Stylidiaceae × 350. Removed from the juncture of the head and thorax.

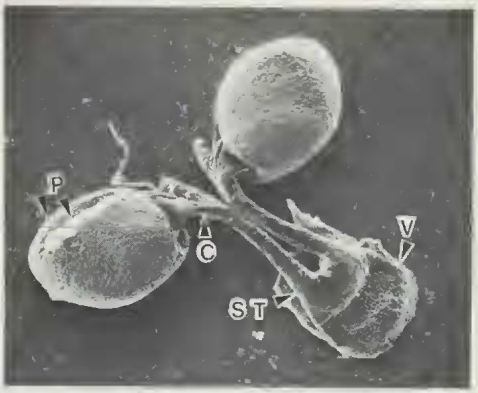

Fig. 4. Scanning Electron Micrograph of the pollinarium of *D. punctatum* × 21. C = caudicle; P = two pollinia composing one set; ST = stipe; V = viscidium.

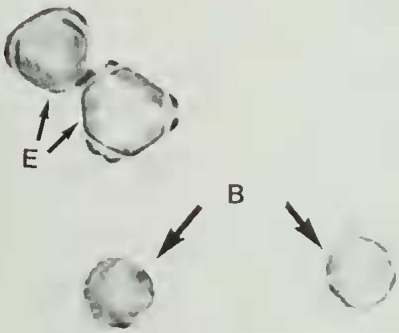

Fig. 3. Pollen of *Eucalyptus* sp. (E) and *Bursaria spinosa* (B) × 192 taken from the scopal hairs of the hind legs.

Fig. 5. SEM of the base of the pollinarium showing how the branches of the stipe (ST) emerge from the shoe-like viscidium (V) × 55.

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